



Typhoon Impacts on China's Precipitation During 1957-1996

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- Objective
- Method
- Results and discussion
- Summary



• Objective

to deal with all the typhoons that influence China and focus on typhoon's impacts on China's precipitation.

In another word, pay attention to study the climatology and the climate change of influencing China typhoon and typhoon precipitation

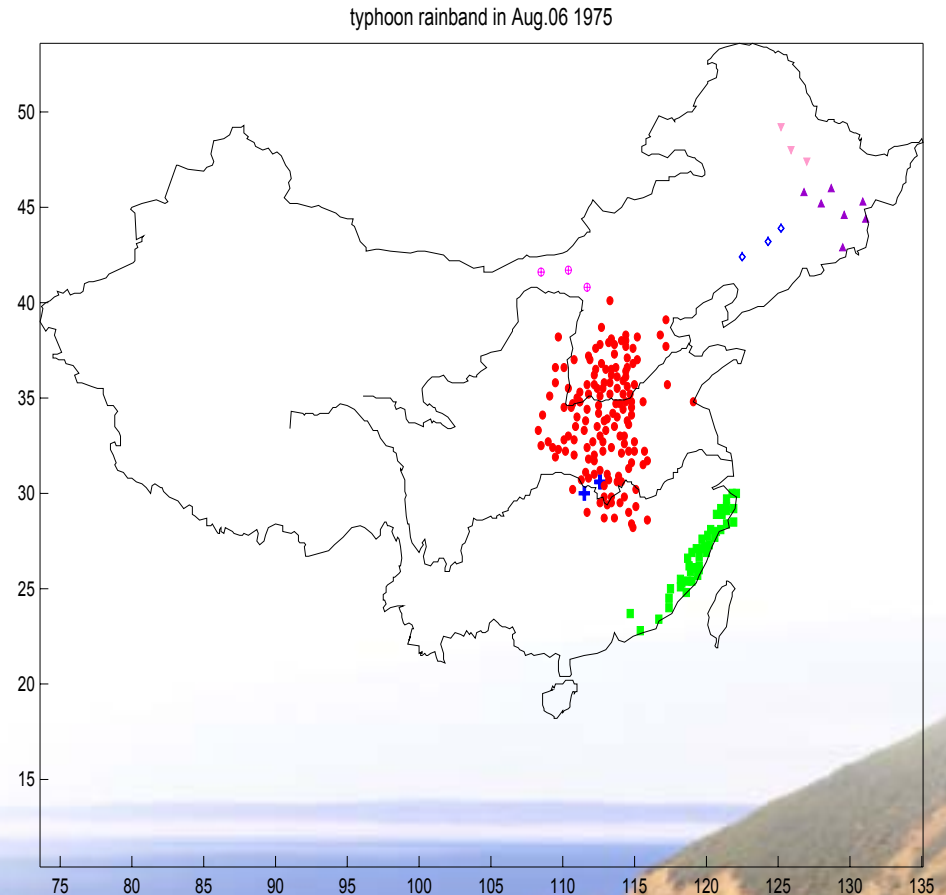
influencing typhoon: when it produces a rainband over the mainland of China or any of the two biggest islands of China, Taiwan and Hainan. It includes two different kinds of typhoon: landfall typhoon and offshore typhoon

• Method



Key step: How can we get reliable typhoon precipitation?

In this study, a numerical technique for partitioning tropical cyclone (TC) precipitation has been developed and was applied, and results from the numerical technique were compared to synoptic 'hand-analysis' maps and were found to be close agreement.





• Results and discussion

Fig.1a 1957~1996 influencing China typhoon frequency(. monthly distribution)

It clearly indicates that almost all (about 99.5%) of the 575 typhoons from the period 1957-1996 occur during May to November, with the most active season between July and September, especially during August in which 150 typhoons occur. Meanwhile, there are only two typhoons in April and one in January, which just passed offshore and affected parts of southeastern coastal regions of China, while no typhoon starting in February, March, or December influences China.

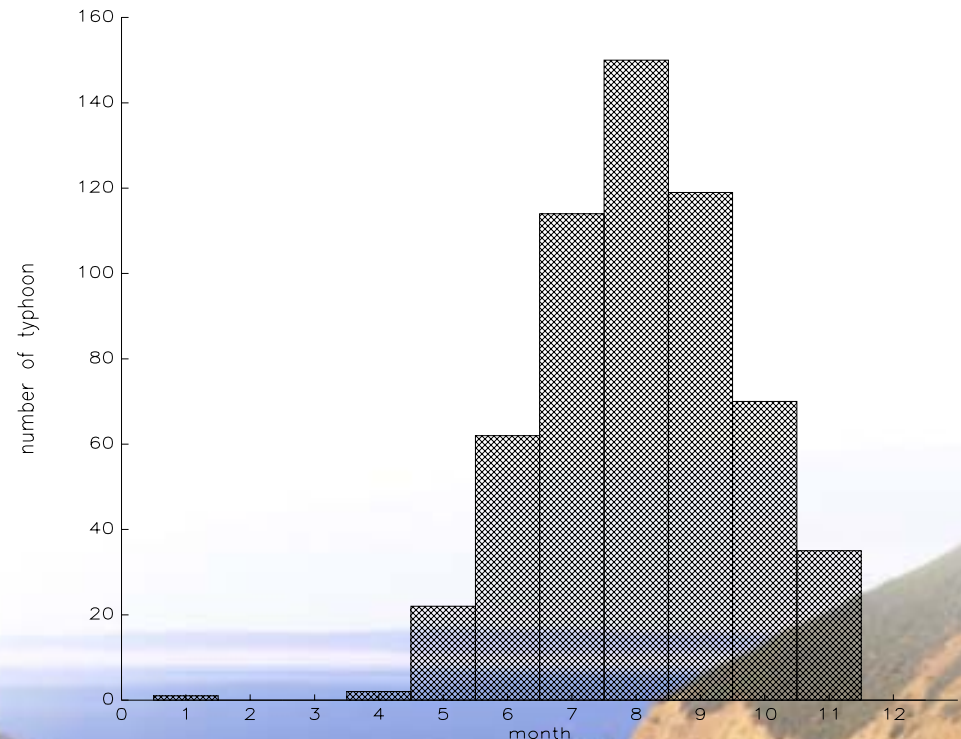


Fig.1b 1957~1996 influencing China typhoon frequency (annual time series)



Figure 1b shows that the influencing typhoon frequency shows prominent year-to-year fluctuations, varying from 6 in 1985 to 22 in 1978. It also shows that greater than normal numbers of typhoons affected China during the early 1960s, most of the 1970s, and 1989-1990, and fewer than normal numbers of typhoons appeared during the late 1950s, the late 1960s, 1985, and 1992-93. However, it shows no significant time trend, with only a slight increase during 1957-1996.

number of typhoon impacting China during 1957-1996

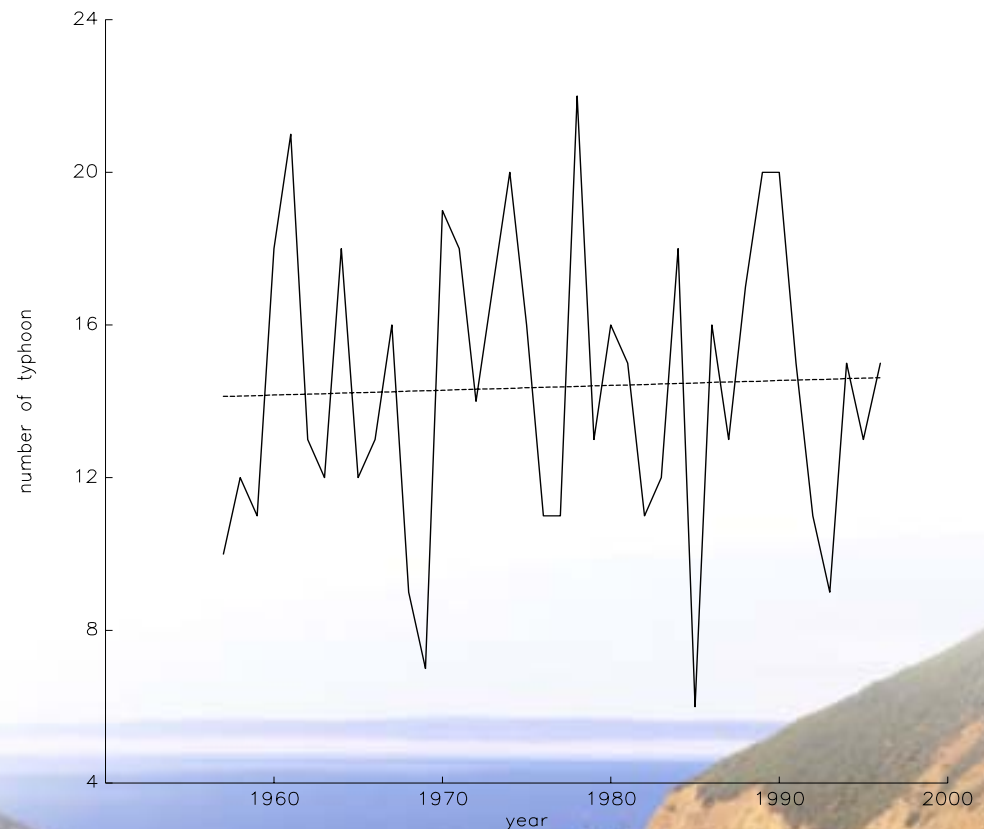


Fig.1c 1957~1996 influencing China typhoon frequency (areal distribution)



average annual typhoon number

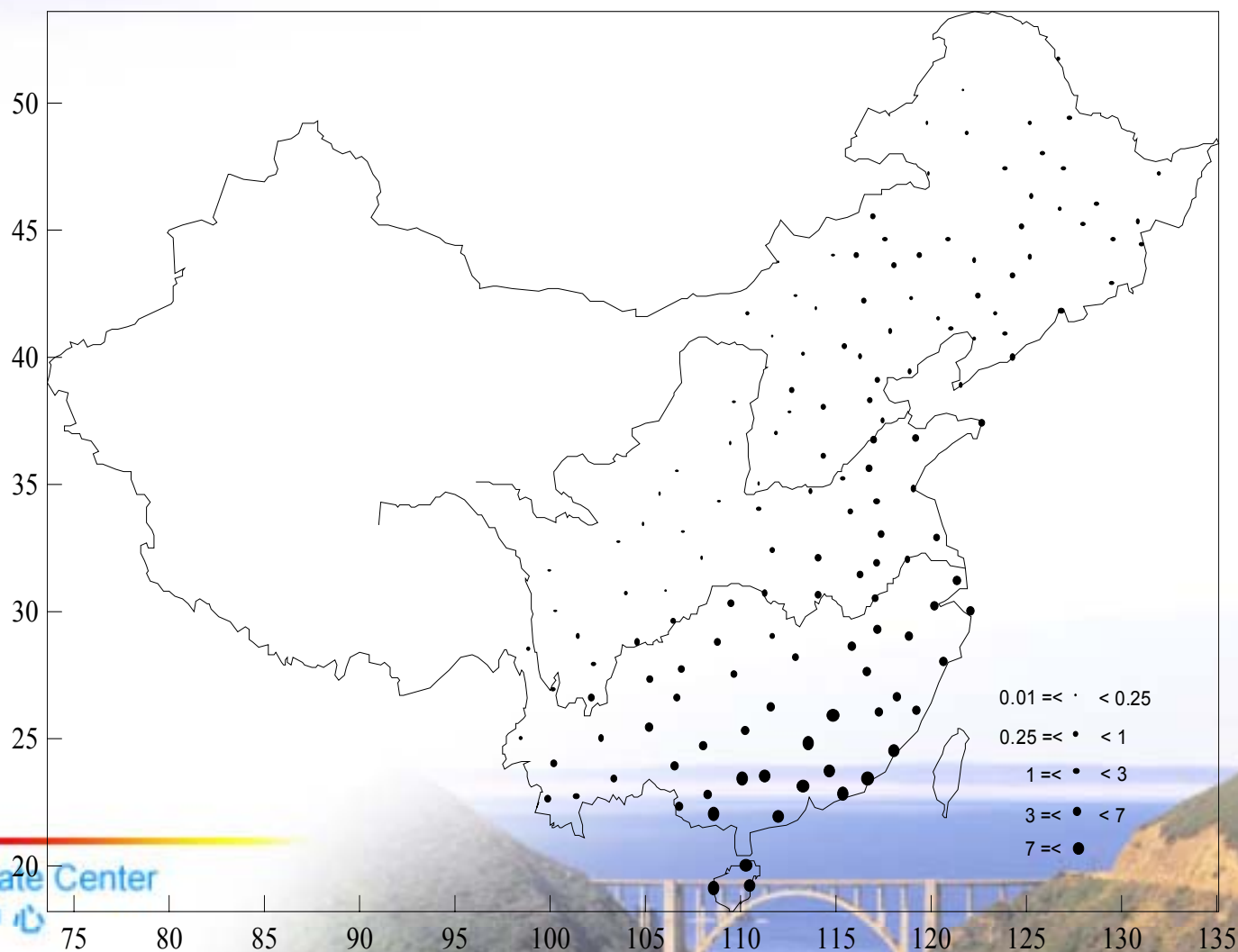
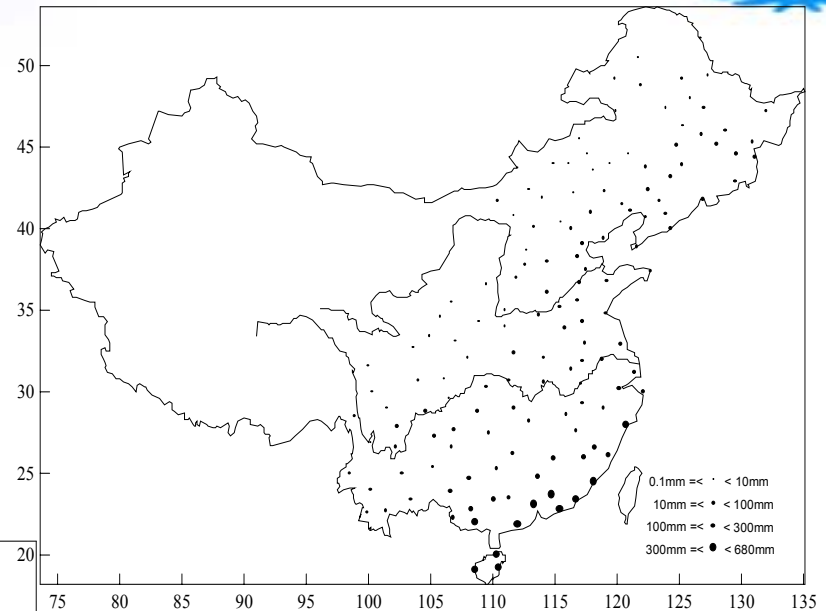


Fig.2 Climatology of station typhoon precipitation during 1957~1996

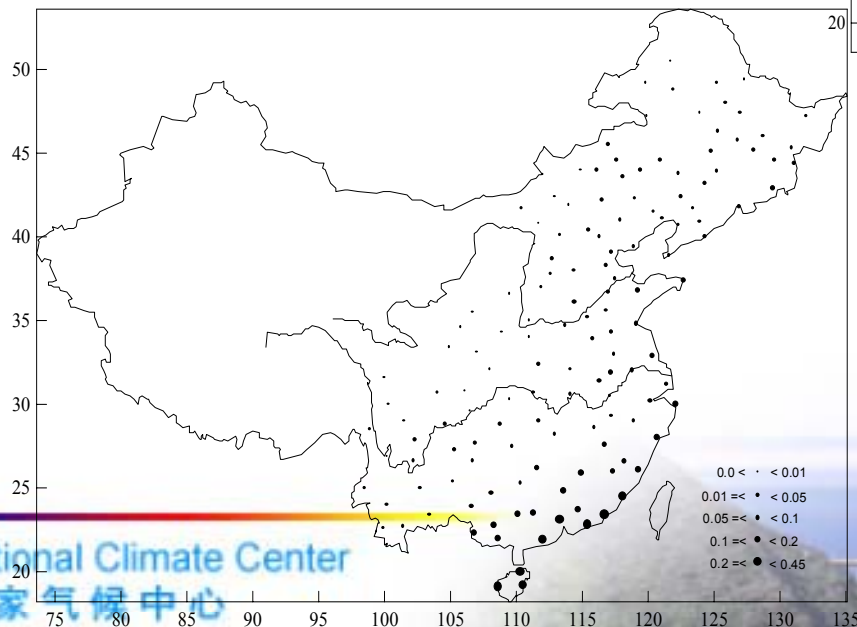


a. areal distribution of average annual typhoon precipitation

average annual typhoon precipitation



average annual rate of typhoon precipitation to total

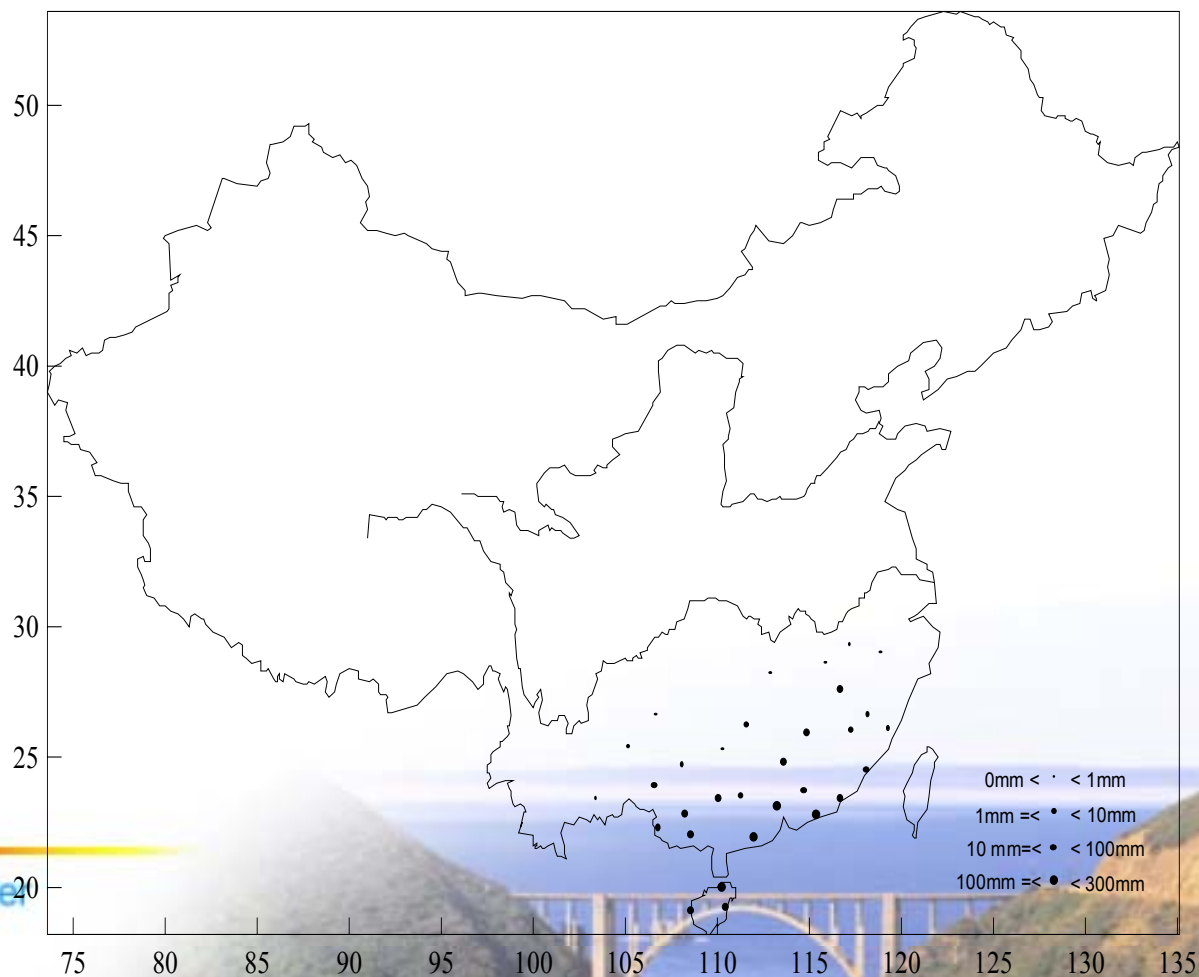


b. areal distribution of rate of average annual typhoon precipitation to average rainfall total;



c. areal distribution of minimum annual typhoon precipitation

distribution of minimum annual typhoon precipitation





d. areal distribution of time trend of annual typhoon precipitation

trend of typhoon annual rainfall

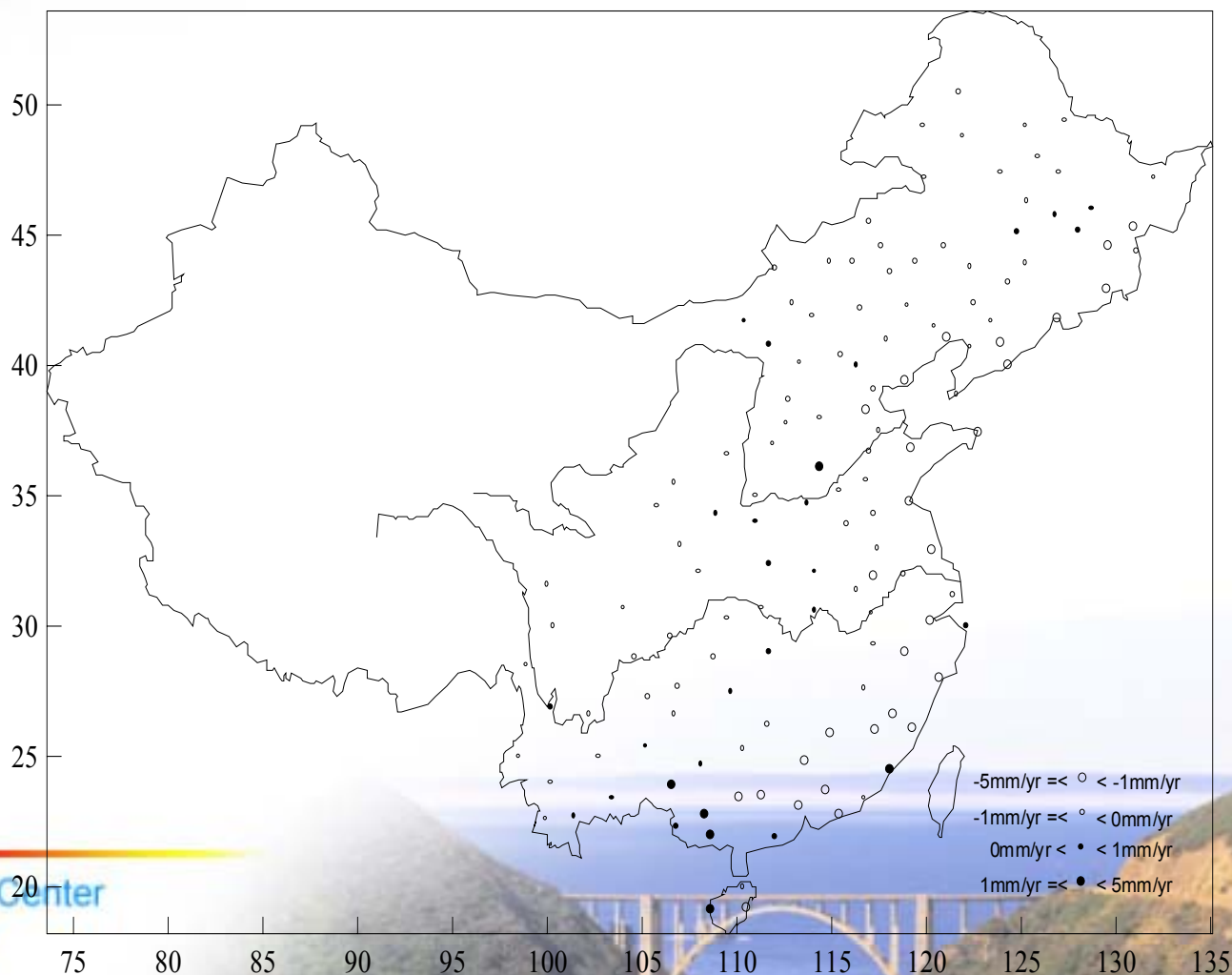
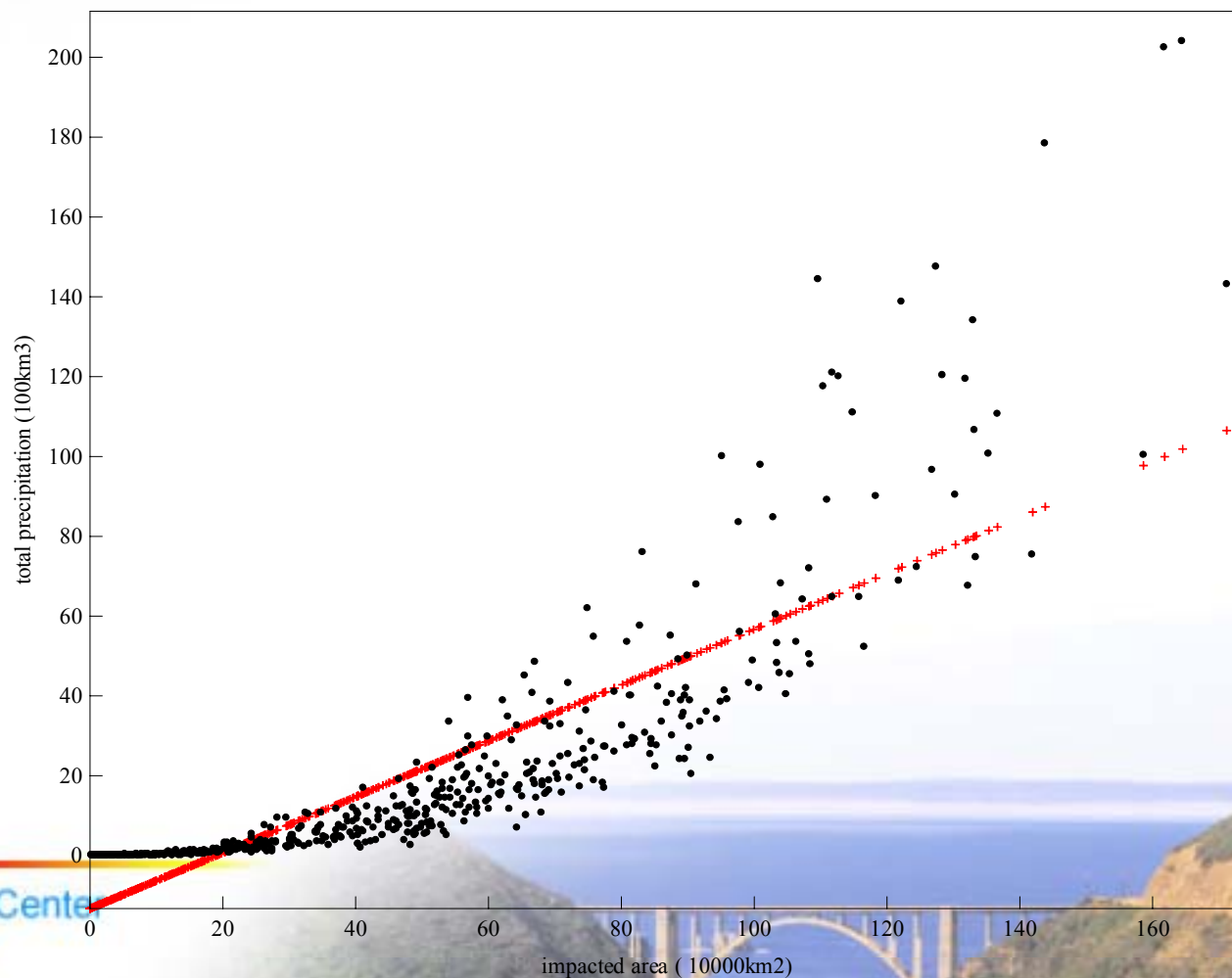


Fig. 3 Impacts of typhoon case



a. distribution of precipitation volume with impacted area and their linear regression line(“+”)

Distribution of volume and impacted area of typhoon case(582) for China during 1957-1996





b. areal distribution of maximum amount of typhoon rainfall in one case.

distribution of maximum rainfall in a typhoon case

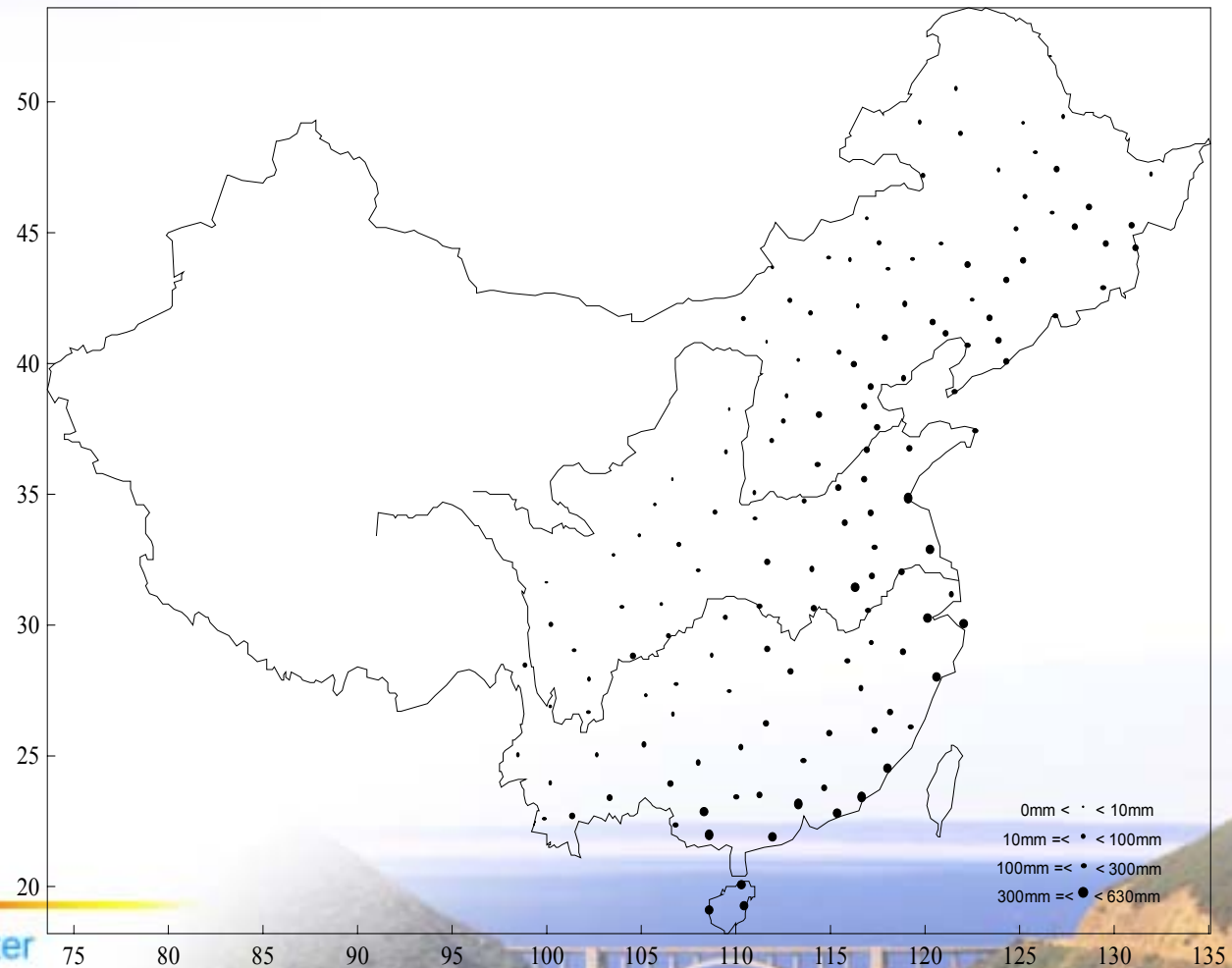
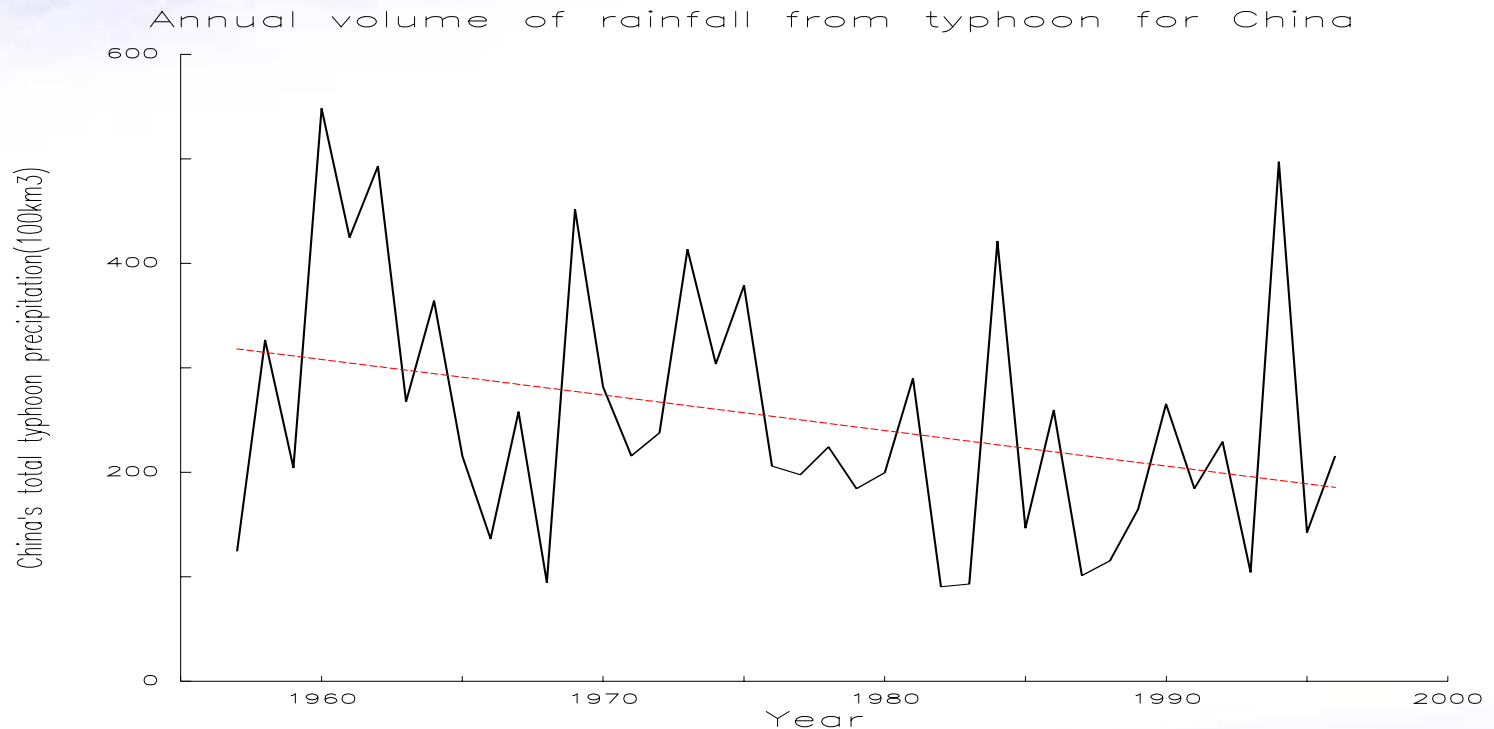


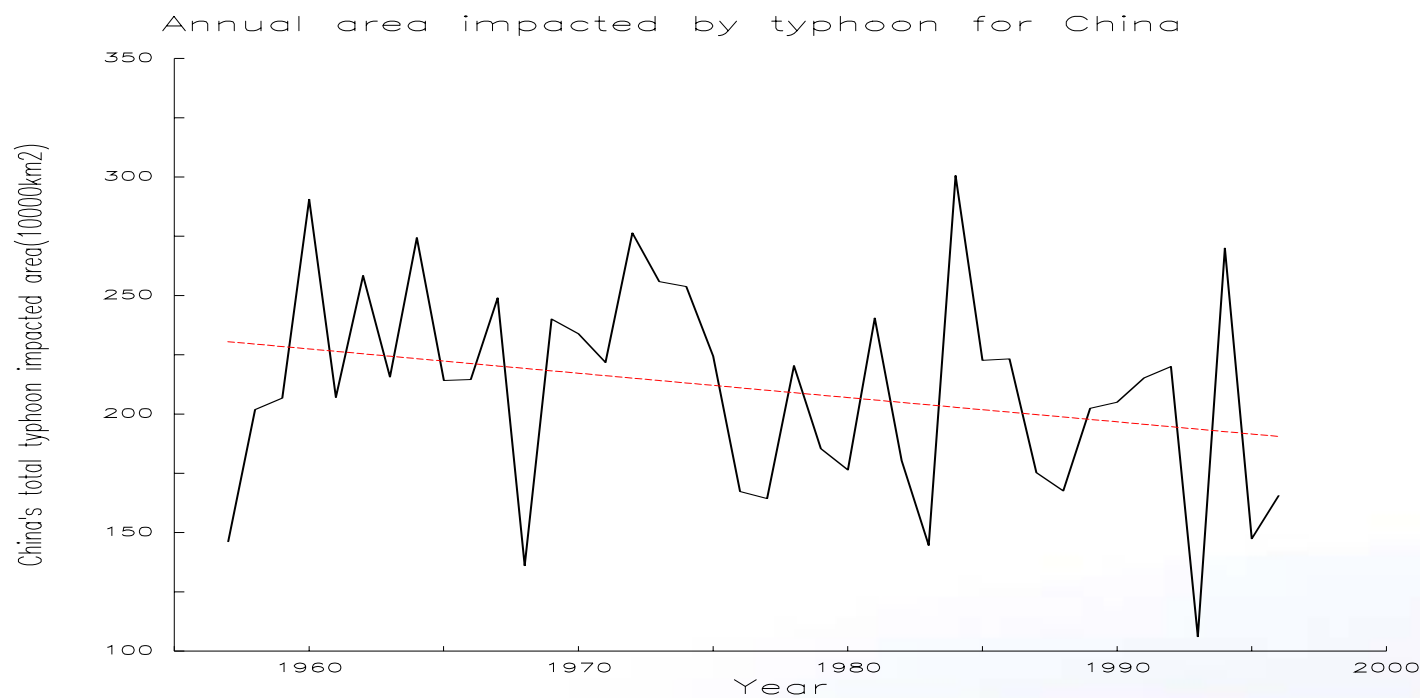
Fig.4 Variations of typhoon Impacts on China's precipitation during 1957~1996



a. variations of annual total volume of typhoon precipitation

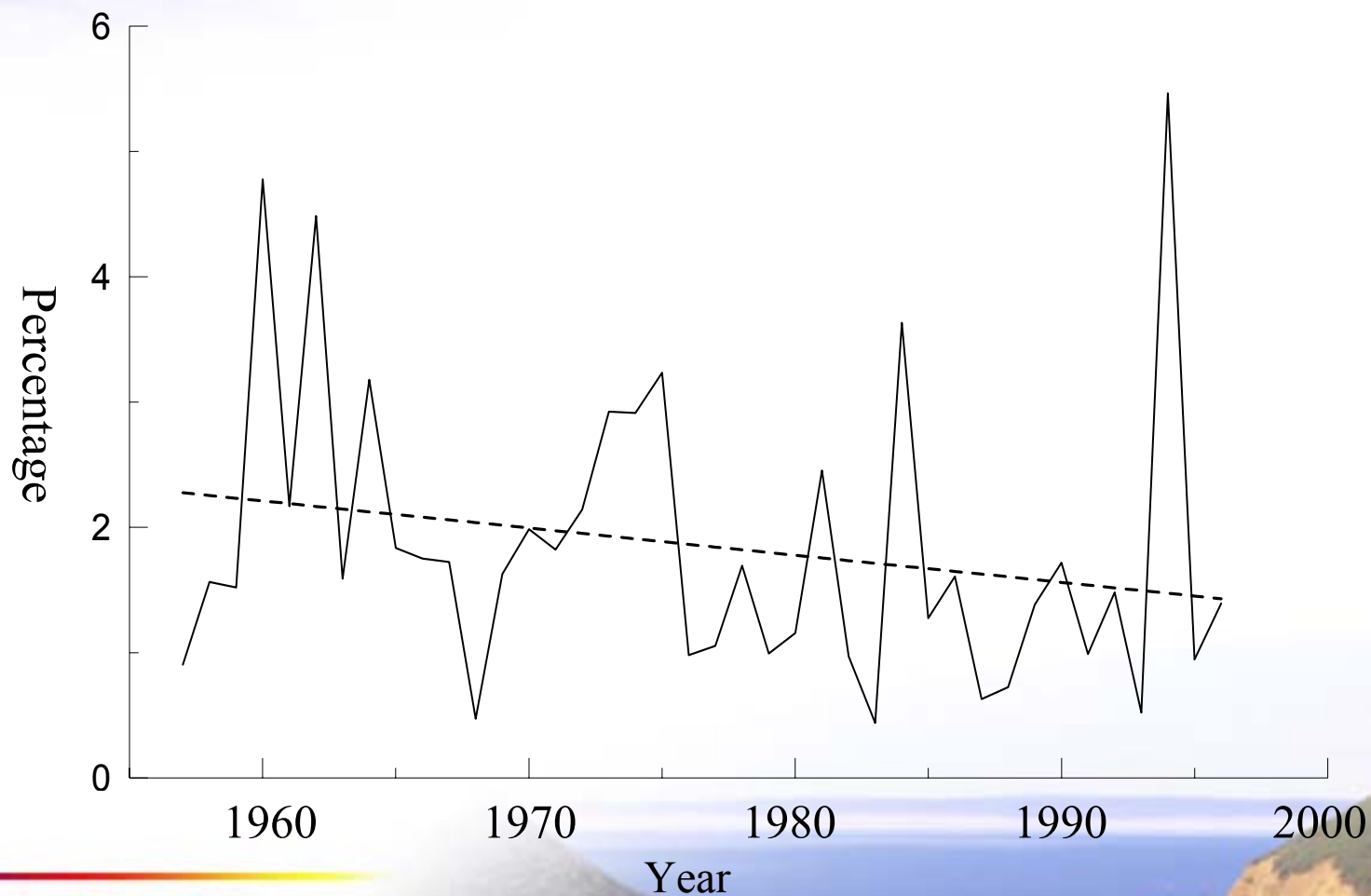


b. variations of annual whole impacted area.





c. contribution of annual typhoon precipitation to overall precipitation





• Summary

- 1) The main season during which typhoons affect China is from May to November, especially between July and September, and the frequency of influencing typhoon shows no significant trend during the past 40 years;
- 2) Hainan and southeastern coastal-most regions are most frequently affected by typhoon, and most of the regions south to the Yangtze River are affected by typhoon each year. In most of the typhoon-influenced region, typhoon precipitation decreases but only significant in southern Northeast China;





- 3) examination of the typhoon cases shows that there exists a significant linear relationship between the precipitation volume and impacted area.
- 4) study of variations of typhoon impacts on China's precipitation suggests that there exists a decreasing trend in the contribution of typhoon precipitation to overall precipitation, while total annual volume of typhoon precipitation decreases significantly during the period



Thanks!





Particularly interesting is the significant decrease in annual total volume of typhoon precipitation in China during the past 40 years, which is consistent with the decrease in annual whole impacted area. In fact, typhoon intensity is an important factor that affects the typhoon influence. According to an inspection of time trends of typhoon case precipitation and impacted area, there exist relative large, although insignificant decrease trends in both the two time series. Considering both the steady variations of annual frequency of influencing typhoon and the decrease trend in typhoon case intensity, it is reasonable for us leading to conclude, at least tentatively, that this result reflects real decrease in annual total volume of typhoon precipitation in China during the 40-year period.